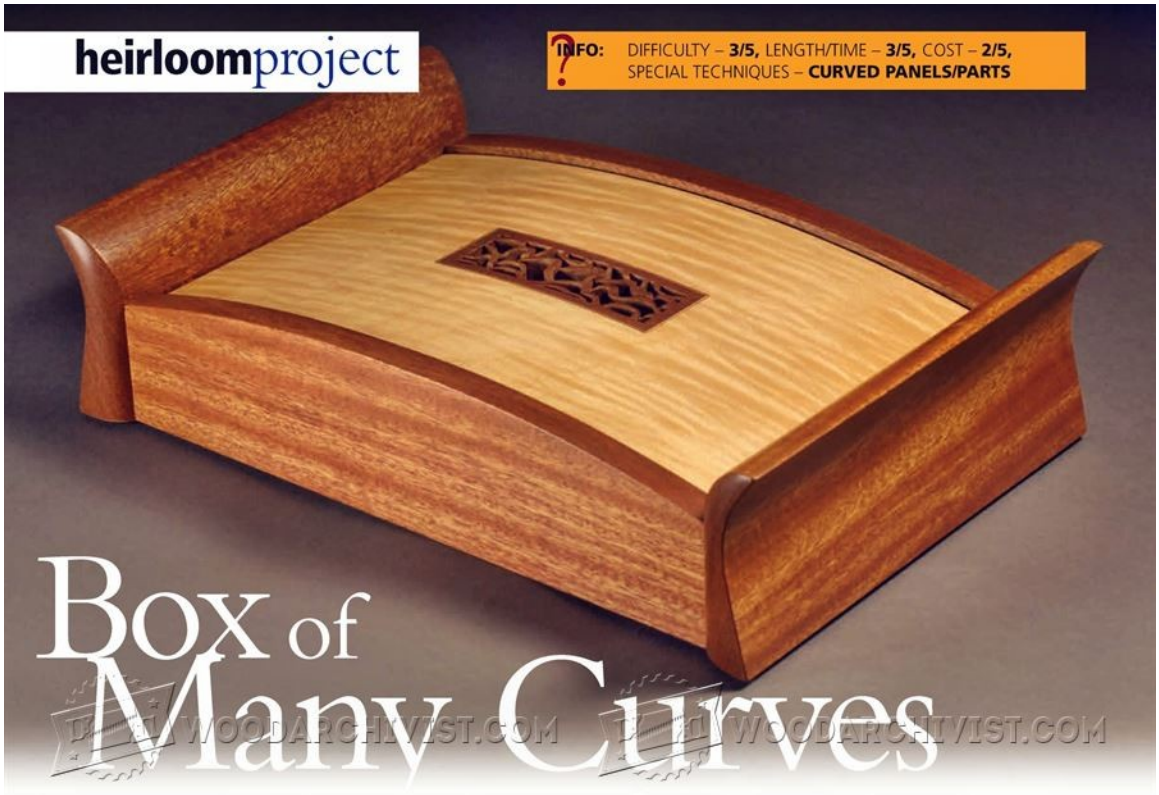
heirloomproject

INFO: DIFFICULTY – **3/5,** LENGTH/TIME – **3/5,** COST – **2/5,**
SPECIAL TECHNIQUES – **CURVED PANELS/PARTS**



Box of Many Curves

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Curves make this box stand out. They also will allow you to work on some new techniques on a small scale. Though curves can add difficulty to a project, as long as you patiently follow these steps, the results will speak for themselves.

BY ROB BROWN

I usually start a project with some sketching and a mock-up, and this was no exception. The small scale of the project allowed me to go right to a full-size version made of 2x4 material. After a few quick trials, in which I realized the curves in my initial design were far too dramatic, the main details were sorted. I had some African mahogany handy, as well as some lightly figured maple veneer for the lid and bottom panel, for contrast. The mahogany was 1 1/8" thick, and I needed all of it to obtain the sides.

The lid

It's easier to shape the front and back to match the curve of the lid than vice versa, so I started by making a form for my vacuum press. I broke out the ribs of the form, routed 22" diameter arcs into their sides and assembled them with cross-members and a bottom to create a strong form. Using a pin-nailer and my vacuum bag, I attached a piece of flexply over the top, then covered it with newsprint so any glue squeeze-out wouldn't cause problems. I prepped the 5/16" flexply core and bottom three layers of veneer then glued everything together. Once dry, I added the top three layers of veneer. I wasn't sure I could get all seven layers glued and together in the press in time, so I didn't chance it. Once it was dry I trimmed it square but left it oversize.

Curved Sides

I broke out the side blank to 3 1/4" wide x 19" long x 1 1/8" thick and traced

Photos by Rob Brown Illustration by Len Churchill

the profile of the mock-up on one end of the blank, to give me something to work towards. My first shaping rip cut was at 12°, to establish the outer/lower face of the sides. I then increased the angle of the blade and made a few passes, adjusting the angle each pass, to help roughly establish the inner/upper curve. The final set of passes was with the outer surface of the sides facing downward, as I nibbled away more material, keeping a close eye on the hand-drawn profile on the end grain. I was careful to leave enough material to allow the outer face of the sides to be supported during the cuts.

I removed the excess waste, either by hand or with some simple hand tools, then used my round bottom hand plane to shape the outer surface of the sides. With the profile shaped, I reached for my round scraper to remove all of the machine marks and unevenness. A block plane took care of the inner/upper curve, followed by an assortment of hand and machine sanding to smooth all the surfaces.

Front and back

Break out the parts, cut them to final length and locate the dowel locations in their ends. You could use a jig, or set up

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Rough-Shaping Cuts – In order to accurately remove most of the material, a number of passes can be made on the table saw. Start with the 12° cut to form the outer/lower surface of the sides, then make a series of angled cuts to form the basic shape of the inner curved surface (left). At this point the inner curve can be rough-shaped. Brown leaves enough material on the blank so it will still support itself during the cut (right).

your drill press to bore the holes, but I opted for a quicker, riskier method to drill the dowel holes. I have used dowels for a long time, and have become comfortable with drilling dowel holes, and in some cases drill them freehand. A sharp, brad-point bit is crucial, as is a steady hand. Before drilling, I made sure to mark where the curved upper edge of the parts would fall, so I could ensure the holes would end up inside the finished part. The curved edge meets the sides at the point where the flat inner/lower face meets the inner/upper curved section. I drilled two ¼" holes in either ends of the front and back, boring a bit deeper than was absolutely necessary.

Mark an arc on the front and back by using the lid as a guide. The lid will sit just over 1/16" below this curved surface when the box is complete. When cutting, leave a little extra material to smooth and fair with hand tools.

Back to the sides

The sides could now be split in two, and cut to final length. I marked a line 5/16" in from both ends, on the sides inner surface, then started to shape the small curve on their ends with hand tools. I stopped just before removing the pencil lines. The varying thickness of the sides, moving from top to bottom, makes it tricky to shape a fair curve; a few practice pieces of softwood will help you get a hang of the operation.

Materials List

Part	Ltr	Qty	T	W	L	Material
Sides	A	2	1 1/8	3 1/8	8 ½	Mahogany
Front / Back	B	2	9/16	2 5/8	11	Mahogany
Bottom Panel	C	1	¼	To	Fit	Plywood
Lid Core	D	1	5/16	To	Fit	Flex-Ply
Lid Veneer	E	6	1/32	To	Fit	Maple
Lid Edging	F	4	1/32	To	Fit	Maple
Solid Insert	G	1	9/16	1 ½	4	Mahogany
Insert Veneer	H	8	1/32	To	Fit	Mahogany / Maple

Hardware List

Name	Qty	Size	Details	Supplier
Press-In Bumpers	4	5mm	00S21.04	Lee Valley
Brass Pins	4	7/16 x 1/8" dia.		Misc

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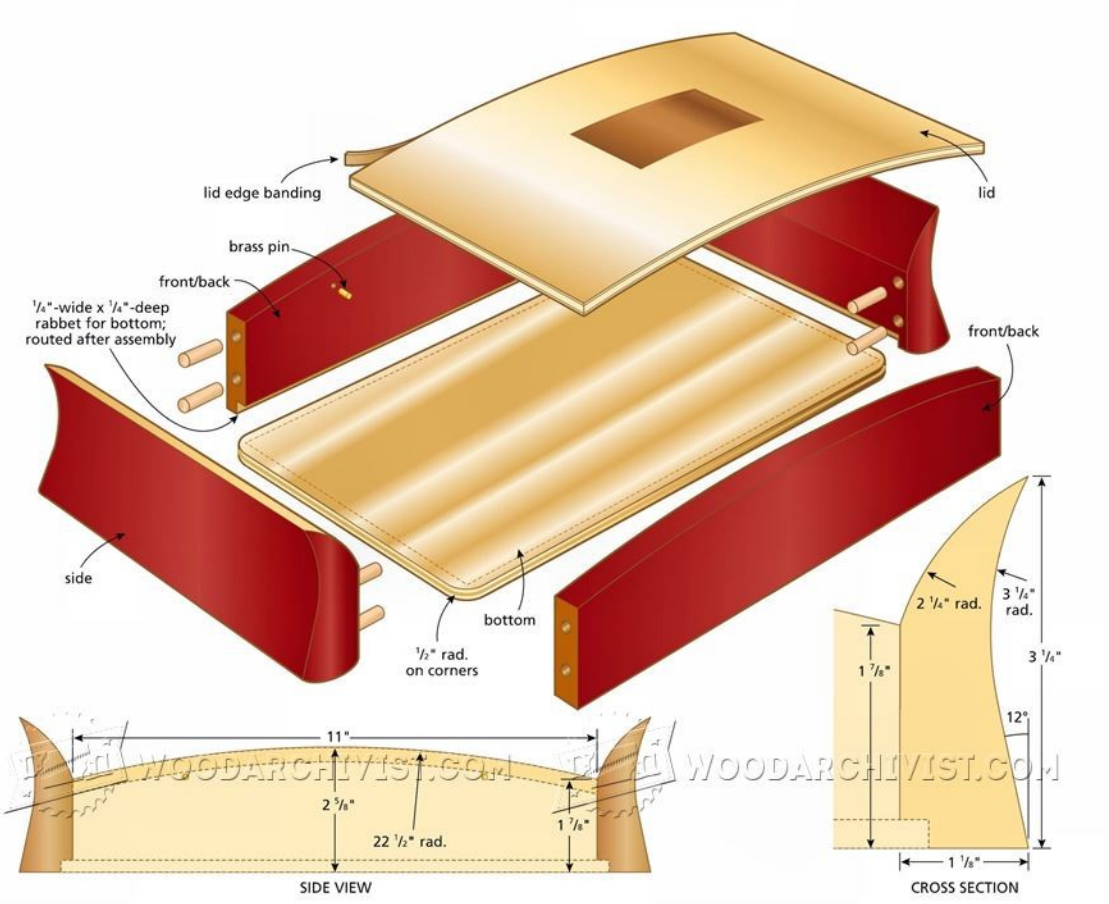
Dowel centers

Insert two dowel centers into the end of the front or back. Using a hard, flat surface to rest the two mating parts on, align the parts, then bring the parts together, leaving two small marks in the side. It is now that you'll want to mark mating parts. Make sure to align the parts so the outer face of the front or back finishes ever so slightly inside the edge between the curved end/inner face of the side. Repeat for the other three corner joints. Using my drill press, and some scrap parts to level the sides, I drilled the eight holes. Be exceptionally careful not to drill through the visible face of the sides. The deeper the hole is, the stronger the joint will be ... but don't play with fire here.

Fair the Curve – Fair the curved surfaces with a block plane, working right up to the line on the end of the blank.



Brass lid stops

With the final thickness of the lid in mind, and the lid's location relative to the front and back, I marked the center point of the ⅛" diameter lid stops. I then drilled the holes about two-thirds of the way through the parts using my drill press. I cut the brass stops to length, filed their ends smooth, then chucked them into my cordless drill. With the trigger on, I used varying grits of sandpaper, then steel wool to smooth the stops and pillow their ends. The final touch was to drill four shallow holes in a piece of scrap, insert the stops and spray on a finish to stop the parts from tarnishing.

Advanced Dowelling – Although many makers would use a drill press, or dowel jig, to drill holes in end grain, Brown uses a keen eye and sharp bit to assist him. During the early stage of drilling a hole, he watches the outer circle the drill bit makes. If it's a complete circle, the hole is being bored perpendicular to the surface. If the circle isn't complete, the angle must be adjusted.

Round the End Grain – An even-looking round-over can be rough-shaped with more aggressive hand tools, like this rasp, then refined with smoother files and sandpaper.

Mating Dowel Holes – With the mating front and side resting on his table saw's surface, Brown lines up the two parts and presses them together, leaving two small indentations. On his drill press, he uses a few simple shims to level the side, then drills the dowel holes, being careful not to drill through the other side.

A quick sanding

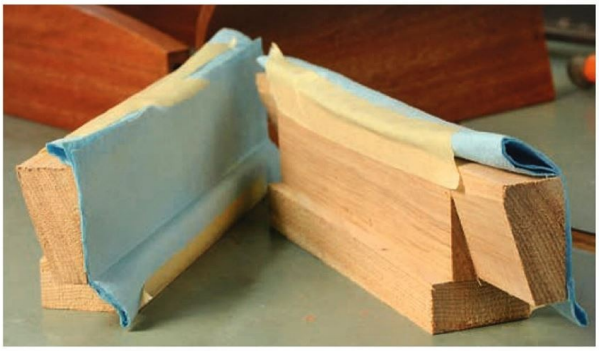
Yet another benefit of building small projects is that the sanding goes quickly. Sand all surfaces, paying special attention to the curved end grain of the sides. I stopped at 180 for everything except the end grain, which was hit with 220. When sanding the end grain of the sides, do your best to ensure the edges mate at exactly the same point. I assembled each joint many times during sanding, just to make sure the final result was what I wanted. What this box lacks in surface area to sand it makes up for in being finicky.

Shellac

Jump to assembly now and you will only pay for it down the road. These parts are easy, even enjoyable, to sand on their own. I mixed up a shellac solution and applied it to the parts. I apply a number of quick coats to all surfaces, then let the parts dry, before a fine sanding, and more coats. Shellac dries very quickly. The four sides of this box were all finished in an afternoon, with very minimal working time. Once the parts dried overnight, I hit them with some #0000 steel wool and wax, followed by a quick buff.

Assembly

Because the outer faces of the sides are curved I had to make dedicated, but simple, cauls. I cut four pieces to about



Dedicated Cauls – Because the four box parts have been finished, Brown made this pair of clamping cauls, covered with thick paper towel, to assist him with assembling the box. After the two similar parts were machined, they were attached to each other, forming a "T". The outer face of each caul was cut with a handsaw, so the clamping heads would apply force perpendicular to the glue line.

Rabbet the Bottom – After a shallow pass to determine where the rabbet would be located, Brown added masking tape to protect the finished surface from the spinning bearing, and made a full-depth pass to establish the rabbet, which will accept the bottom.

Trim the Lid – In order to trim the lid to length, at an angle, Brown traces a line on his mitre gauge and visually lines up the lid. The resulting angle may not be perfect, but will be close and consistent. He uses small shims if angled cuts are required. Patience is important for an even-fitting lid.

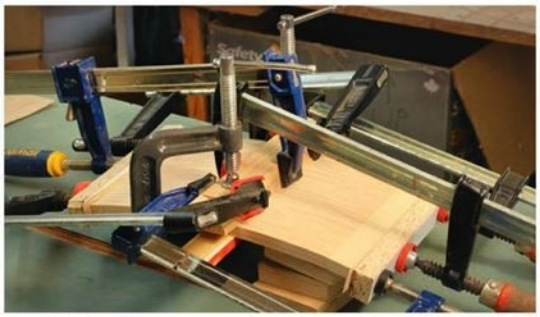
1 ½" x ¾" x 8" and screwed them together to form a long "T". With a handsaw I cut a 12° notch in both ends of the vertical portion of each "T". This was so a clamp head could be positioned on it, and when tightened, would apply force perpendicular to the joint. I also taped some thick paper towels to the inner surface of the cauls, to keep them from marring the shellac finish.

I applied glue to only two of the joints, and assembled the box, as I wasn't confident I had enough time to do any more. An hour later I glued and assembled the other two joints. Both times I ensured the box was square.

Bottom Panel

Although you could simply use a pre-veneered panel for the bottom, I wanted to use some of the figured maple I used for the lid. I pressed the panel in my vacuum press and trimmed it square, leaving it oversize. I prepared my router table with a rabbet bit, set to cut a ¼" deep cut, and the same height as my bottom panel.

I positioned the assembled box over the rabbet bit, and made a shallow pass, keeping the bearing from touching the inner wall of the box. A few strips of tape were added to the inner



Angled Clamping – In order to keep clamping pressure perpendicular to the glue line, Brown starts by clamping a block, with slightly angled edges, to the outside of the lid. Future clamps can apply force to this block while applying the edge veneer.

Finish the Finish – Once the shellac is fully cured, rub the surfaces out with wax and #0000 steel wool. The resulting surface will be smooth, with an even sheen.

surface to protect the finished surface and I ran the rabbet around the perimeter of the box.

I then cut the bottom panel to size, sneaking up on a friction fit, then marked and cut its four corners with a radius matching the rabbet bit I used. A bit of hand sanding for the final fit ensured a clean joint if the box was ever turned upside down. I sanded and finished the upper surface of the bottom panel and installed it.

The lid and underside

I ripped the lid to width on my table saw, then used my mitre gauge to cross-cut the first end. I traced a curved line on the wood fence of my mitre gauge so I could repeat the same angle. Once the brass pins were inserted, a quick check against the box let me know how the fit was. I used a folded paper shim to fine-tune the angle, until a perfect fit was achieved. I snuck up on the fourth edge, as I didn't want to be left short.

To cover the edges of the lid I applied veneer, first to the shorter ends. Because the lid edges are angled I needed to come up with a way of transferring pressure, once again perpendicular to the glue line. I unscrewed the clamping caul I used to assemble the box, planed a gentle bevel to both its sides and clamped it to the upper surface of the lid.

I proceeded to glue veneer to both ends. Once dry, I carefully trimmed the veneer and applied veneer to the front and back edge. When dry, I trimmed the veneer and tested the fit. A small, even gap all around, and the lid was done. That is, unless you want to get fancy, and add a decorative Japanese wave motif to the middle of the lid (for details, see page 26 of this issue). The lid can now be finished on all sides.

Flush and sand the underside of the box, then drill four holes near the corners to accept small rubber bumpers. Apply a finish, install the rubber feet and put the box to use.

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